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Functional Text Geometry
The Essentials of Perspective Text Analysis

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Abstract The production of string rotation and pattern dynamics through the generation of text must build on the presence of a reversible rotary motor, which has a synthesizing capacity. This is the discovered AaO-mechanism, which has the power to capture synthesis through emerging AaO-rings. Further, the transcription through the Functional Clause (FC) provides the foundation for their differentiation and decides on the trend in the governing messengers. A precisely definable number of messengers is steering and controlling the algorithmic working of this mechanism. In focusing on angular articulation, it will be demonstrated that different magnitudes (measured in radians) constitute the expression of an articulation in FC. It is shown that the function of radians allow the demonstration of value integration. Moreover, directional rotation in the messengers is essential. Furthermore, through proper localisation of the corresponding function-value integrations, it will be demonstrated that changing AaO-states are producing covalent bindings, which restrict the number of possible angular positions to very few. Since the direction of binding varies systematically, it reflects structural change.

Evolutionary Language Dynamics

The shortcomings and difficulties, associated with the conventional science view on the application of analytical propositions require an alternative approach. This means a dynamic contact with reality, which has to be based on the AaO-axiom (B. Bierschenk, 1984, 1991, 1993a). This axiom has to be made the foundation for the treatment of intention. But the intention, underlying a proposition or captured through a discourse, is necessarily dependent on a text producer (B. Bierschenk, 2004). Thus, both text producer and intention are discoverable through the AaO-mechanism, which is biologically embedded in the complexity of natural language systems (I. Bierschenk, 2011).

A concentration on individual text building behaviour is the condition, which has made it possible to demonstrate intention and orientation faultless through configurations of AaO-systems and to extract the direction in the identified movement patterns (I. Bierschenk & B. Bierschenk, 2011). In previous studies, textual pattern movements have been made manifest, which implies that the captured text producer has been shown to be the result of the exactness and precision in the working of the AaO-mechanism. It follows that the original import of the concept of synthesis has been captured in strictly technical terms.

In its most fundamental delineation the exactness and precision in processing by means of the AaO-machine refers to its bookkeeping capacity, which is manifesting its internal state and the state of its textual environment. Both define uniquely the next state it will go to. Founded on this definition of a general machine, the concept of synthesis has been operationalised with an abstract language space in mind. In sum, what matters in this characterisation of synthesis is the non-failing hit-mechanism of the AaO-machine. Independent of the idea that a mechanism must be made of actual matter, the AaO-mechanism concerns the law-abiding, and consequently its algorithmic behaviour.

From the system's point of view, the orientation in the approach path of (A) and (O)

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refers to directedness in the biological sense and change in orientation with respect to specific solutions, offered through the floating equilibration of the developing language equations. In particular, the dynamic behaviour of the AaO-systems provides the basis for proper language solutions through the establishment of equilibrium states. Hence, for the discovery of intentional dynamics, one must be able (1) to make the producer known through the production and (2) to recover the underlying intention and orientation through attitudinal changes stepwise, and according to Baeyer (1999, pp. 12-14) “without intervening dissociations and in perfect order”.

Nature’s String Stitching Device for the Production of a Language Space

In any scientific study of natural language it is necessary to consider the concept of natural as opposed to non-natural or formal. By natural is meant “that which nature creates” but nevertheless, human language is constantly being studied as if it were something non-natural or artificial, created by humans themselves. In departing from the basic hypothesis that nature is the producer of language, it is required that the scientific standpoint must be to explore the mechanism responsible for the proper production as well as the underlying plan.

About the last turn of the century, Karl Ernst von Baer (1792-1876) already proposed the concept of Bauplan to be able to discuss the deep commonalty that biological mechanisms show in their evolution of behaviour patterns. For example, Raff (1996) discusses the biological meaning of the concept from an evolutionary point of view and refers to the fact that von Baer could show that not even at the genetic level there is any strict or uniform reproduction. Instead, the genetic mechanism steadily is producing new forms of expression. Moreover, Ernst Häckel (1834-1919) introduced the concept of heterochrony and proposed the hypothesis of character displacement (McNamara, 1997). Hence, through the dislocation of characters in the order of succession, every new form of any biological expression is establishing itself as a result of novel terminal states.

It would not be out of place to mention that this observation has not only continuous value but also far-reaching consequences for a study of language as a phenomenon of nature (I. Bierschenk & B. Bierschenk, 2004). From a strictly scientific point of view it is, however, not sufficient to take the point of departure in nature as the architect of a Bauplan. Speaking of a Bauplan has no sense in the absence of an agent.

The essential property of the string hypothesis of Edward Witten (Greene, 1999, p. 298) is replacing the hypothesis of a zero-dimensional point, as proposed by classical physics, with the one-dimensional string. A string appears in the presence of a small kinetic potential (ν_p). Since the ν-function of a string represents the energy needed to produce a signal of intent, it is controlled by a stepping function (i), which governs the materialisation of a kinetic potential in the form of a signal (σ_i).

The component (ν_p) of the compound ($\nu_p \wedge \sigma_i$) is assumed to be “proportional to the radius of the circular dimension of an unwrapped string” (Greene, 1999, p. 238; Hestenes, 1986/1993, p. 67). Since a component of an unwrapped string is supposed to have some minimum length, operating with the string-concept translates into the problem of formalising some of the basic operations that can be performed with reference to the length of certain strings (σ_i).

The expression of potential energy (ν_p) for N strings in three dimensions, namely the dimensions of (1) intention, (2) orientation and (3) direction, may be conceptualised as the components of a 3N-dimensional vector (**X**). Hence, v(**X**) is a 3N-dimensional object, embedded in a (3N+1) dimensional space. The extra dimension corresponds to the value (= magnitude) of the potential energy function (Wales, 2003, p. 2).

In an attempt to make the problem of winding strings operational (B. Bierschenk, 2001b), it is assumed that kinetic energy is stored in wound grapheme compounds. Hence,

when strings are resonating ($\Delta\sigma$), they are producing a spectrum for the expression [$\gamma = (\nu \wedge \sigma)$], which leads to the bi-directional grapheme-vector ($|\gamma|$). For this reason, the outer product ($\wedge$) provides a unique relationship, which constitutes the foundation for the "attitude spinor" (Hestenes, 1994, p. 72) and consequently a distinction between direction and orientation as a function of states. In addition, Hestenes (1986/1993, pp. 66-68) asserts that the angle ($|\theta|$) represents the magnitude of a spinor. This kind of operations is expected to be sufficient for a functional expression of the magnitude of a string and to regard the exponential function ($e^{i\theta}$) as the numerical magnitude of a grapheme.

Some fundamental grapheme dimensions

Kinetic energy is generating the flow-fields in which produced strings can vibrate and fluctuate. First and foremost, when a string resonates with a particular grapheme, it gets its orientation as a function of spatial coordinates. This property can be used in reformulating the presence of a grapheme and to conceive it as a mono-layered composite, which is embedded in a multidimensional space. Thereby, it is possible to associate a certain geometric property with the dimension of orientation (o) of patterned strings. This argument implies that the dimension of intention (ι) is another geometric property that can be taken into account in a semantic-free characterisation of patterning (B. Bierschenk, 2001a, 2005). Following up this line of thought implies that at least five dimensions are taking part in the realisation of a grapheme. Further, this patterning will be utilised as basis for the determination of non-vanishing and thus stressing forces in multi-dimensional spaces.

Basically, "all strings are absolutely identical" (Greene, 1999, p. 146). This proposition implies that any string can be represented by a spinor. But conceptual differences between the notion of a string and the expression of graphemes "… arise because their respective strings undergo different resonant vibrational patterns" (Greene, 1999, p. 146). When differently materialised graphemes are conceived of as different marks on a fundamental string, the meaning of a mark at the kinetic level of text production can be tested experimentally. Now, from the investigational point of view, the relation between individual graphemes and their textual context needs to be addressed.

Individual graphemes are the elements of text production. By definition, they do not develop evolutionary. On the other hand, text production, as it appears at the textual level, must be related to variety and variability. It follows that the variability of a composite refers not to individuality but to growth, which manifests itself through the presence or absence of sequences of graphemes. If a composite is growing, "this lowers the short-distance sensitivity" (Greene, 1999, p. 155) of a sequence. Therefore, uniqueness of a grapheme is always expressed as a compound, but the absence of a grapheme must simultaneously be related to unwrapped strings, which in their relaxed state appear as looping strings. However, when winding of a string is determined by a minimum, it corresponds to a mechanical stable configuration state, since any displacement in a particular region of an energy space has consequences. Increasing distance can be extracted from the gradient dynamics, which is characteristic of angular articulation.

When grapheme production is considered from a geometric point of view, it becomes evident that the space related movements of graphemes may support very large numbers of local minima and consequently determine how various regions become curved towards the global minimum of a space. On the other hand, the dynamic behaviour of a grapheme depends on the way in which local minima are connected in space and form energy landscapes. The term energy landscape (EL) refers to spinning dots (B. Bierschenk, 2001b). Subsequently, EL includes both Free Energy Surfaces (FES) as well as Potential Energy Surfaces (PES), which is a more fundamental entity, since there is no requirement for a subjective parameter choice.

When spinning dots are producing PES, they generate high-dimensional properties. On the other hand, produced FES, which are characterised by thermodynamic properties, allow a global view on the notion structure. Empirically, it will be demonstrated that PES and EFS, based on the developed Agent-action-Objective (AaO) formalism have the capacity to re-produce the structure contained in textual spaces.

In view of the fact that the "Functional Clause" of the AaO-approach is more in line with Hestenes "Functional Geometry", it has been possible to show that it is more efficient to propose a "Functional Text Geometry" (B. Bierschenk & I. Bierschenk, 2011) and to work with geometrical compared to numerical computation. To be able to give a geometrical account of the observed evolution of open spherical AaO-spaces, spinors must be related to winding strings and their crossing of borders. The basis for the regularities in the winding can be determined directly at the ecological level through the A- and O-spinors. As a result, it will be made apparent that the AaO-functions and the rotations in the variables of ($A=\alpha$) and the variables of ($O=\beta$) are reproducing dynamical changes, flows and rhythms that are responsible for the differences in the established composites. Finally, it will also be demonstrated that the special character of the involved operations will generate functional space symmetries. This means that the involved synthesising processes must be conceived of as the outcome of biological coordination in space production.

The AaO-ring

Biologically conceived, an AaO-unit must be treated as the most primitive and hence the most general mechanism used in the synthesising process. At first, the mechanism seems to produce a simple ring structure, which is synthesising organism-environment interactions into a intangible relation. This abstract relation is producing compounds and is stringing together compounds into grapheme composites. This process appears to work in a rhythmic and clock-like manner. Moreover, it is demonstrable that this basic mechanism is generating composites of growing complexity. As a consequence, increasing complexity through time and textual evolution makes it necessary to introduce the concept of a super string.

"In order to keep track of a prescribed path" and to recover the ideas underlying a path "one by one without gaps and in perfect order" a super string may be conceived of as part of an "effective notation" (von Baeyer, 1999, p. 12). The super string and the appearance of evolutionary changes during a "flat molecular formation" (Hardison, 1999, p. 126) in the production of a verbal flow was detected by the present author in the beginning of the 80's. With reference to Hardison's exposé, the concept of a flat molecular formation will be taken as a suitable notation for the primitive form of an emerging AaO-system. Hence, in its most primitive appearance, it will be called the AaO-ring.

In function, the AaO-ring is definitely different compared to the conventional description of sets of point standing in definite relation to one another. Rather the AaO-ring is describing the intentional property of a set of variables, which reside in the ring. Thus, the notion of a ring can be separated from the notion of an area that consists as a set of points. It follows that intention is an indispensable component in the determination of distance between neighbouring variables. Therefore, attempted is a physical measure of intentionality on the basis of established sequences. Of course, during development the evolutionary path becomes embedded in larger compositions, governing text production.

In addition, in the production of AaO-units, there is no strict recapitulation of any primitive form. Textual evolution requires that new forms of text building behaviour appear as a result of new terminal states. Furthermore, it has become obvious that the evolution of a text on the basis of the AaO-machine is controlled by two biological clocks, the A-clock, which is governing the Agent-component and the O-clock, governing the Objective-

component. Both allow exact measures and precise description of the pattern dynamics of a verbal flow.

From an evolutionary point of view, the solutions concern the language equations from which any computation must take its departure. The procedure for their establishment consists of the following five steps:

(1) determination of elementary strings of graphemes,
(2) production of interval-specific markers,
(3) identification of phase-transitions,
(4) processing of angular string articulation,
(5) determination of super strings.

The working of the AaO-units is absolute in the sense that the bookkeeping procedures can never make any mistake. Hence, their errorless working with respect to a processed target condition is the applied definition of preciseness and with respect to a natural language expression the applied definition of completeness.

Axiomatic Foundation

Simply expressed, the axiomatic basis of the AaO-units implies that the mechanism cannot miss its target. Getting to know the A-component of the AaO-unit through someone’s style of writing implies that a planned action becomes real and that its linguistic expression reflects the nature of the action, which is the production of a strict AaO-dependency. To be able to identify the agent (A) presupposes that its identity may be discovered, which is possible only under the condition that he/she speaks or writes something. In the present context, the assumed basic principle underlying the axiomatic foundation of strict dependency is the following:

$$\text{AaO} \rightarrow \text{Axiom} \qquad (1)$$

Its successful identification builds on the presence of an action (a). Within the Functional Clause, the presence of a verb marks the movement dynamics. It follows that the (a) component of the AaO unity is determining the specific bonding relations, which the verbs, participating in a verbal expression, have absorbed. However, it is crucial that one can catch the corresponding movement at the textual level, which cannot be done without some suitable formula that makes the stated principle functional. The principle stated in Expression (1) is assumed to be valid for all living systems (Hardison, 1999) and presupposes a dual steering and control mechanism (Cook, 1986), which is anchored in the AaO-unity. Further, as the a-priori principle of all living systems, it is the foundation for the establishment of the reversible synthetic rotary molecular motor of the AaO (B. Bierschenk, 2002; Hernández, Kay, & Leigh, 2004).

By this assumption, it is likewise stated that the principle is reflecting natural law. However, the reflection requires, according to Hardison, the introduction of a copy of the principle, as shown in Expression (2).

$$[\text{A}\rightarrow\text{a}\rightarrow\text{O}] \rightarrow \text{Theorem} \qquad (2)$$

The [] refers to the production of a standard copy and (→) refers to directedness which has testable consequences. Accordingly, the directedness in the coupling of the components becomes functional in the moment when a copy of the A- and O-components is being

realised. If its validity can be made evident, this means that the biological mechanism underlying natural language production is discoverable. The process of copying a copy is carried out irrespective of its meaning. Further, each time such a copy is being copied, the copying process is reflecting natural law.

When either the [A] or the [O] component is missing at the textual level, incompleteness is to hand. In Expression (3), this circumstance is symbolised with their placeholders (∅).

$$[\varnothing_A a \varnothing_O] \rightarrow \text{Incompleteness} \qquad (3)$$

It would not be inappropriate to mention that the placeholders (∅) of Expression (3) are dummies, which have far-reaching consequence for the study of the validity of the AaO-approach. That the formula steadily is producing new forms of textual embodiments means that irreversible time enters into the process, which makes the AaO-mechanism always departing from any strict or uniform reproduction.

Except that reiteration takes place in strictly mechanical terms, the cooperative interaction between different copies of [A] and [O] are producing various displacements through their dislocation. In its technical meaning, reiteration allows for the reappearance of ($\varnothing_A$) and ($\varnothing_O$), which implies zero occurrences at the surface level of text processing. Repetition or duplication means on the other hand that at least one occurrence is a textual expression of either [A] or [O]. This condition will be symbolised in Expression (4).

$$[Aa \rightarrow (\varnothing_A a \varnothing_O)] \rightarrow \text{Interacting Sequence} \qquad (4)$$

Hence, through the occurrence of (A-O composites) and directedness *(*→) in the dislocation of different components as well as to the orientation in the order of succession, every new textual expression is establishing itself as a new form and the result of novel terminal states.

Geometric Computation

As cited in Hestenes (1986/1993, p. 5), René Descartes (1637) states that “any problem in geometry can easily be reduced to such terms that a knowledge of the lengths of certain straight lines is sufficient for its construction”. Hence, it must be possible to show that this condition is sufficient for the re-construction of a language space. Moreover, it has been promising to demonstrate that the developed AaO-formalism has the capacity to reproduce the space of a particular text. This implies that angular articulation and change in attitude, i.e. in the mathematical sense, provide the context for the construction of an efficient geometric basis for the observation of string movements and description of their pattern dynamics.

Since the bonding of variables to places where attractions occur is symbolised with the (∅), the dummy reappears as propagating placeholder. But it is the reversible rotary motor that is forming bonds between chains of A’s and O’s surface-oriented. The formula of Expression (4) can accordingly be evaluated on the basis of the Euler-theorem:

$$(J+L = (K=2) \rightarrow 2K=V)), \text{ where J: joint, L: link, K: slant, V: vertex} \qquad (5)$$

Surface-oriented calculation may be illustrated with the expression: (*I imagine, the attitude is today…*), and operates as revealed in Figure 1. Simple counting of its slants (K) confirms the validity of the theorem (Expression 5). Hence, “the proof comes from the processing itself” (Mackenzie, 1998, p. 524). The solution to the pairing of two AaO units is geometrically indicated with (HL), which is coupling the units surface-oriented.

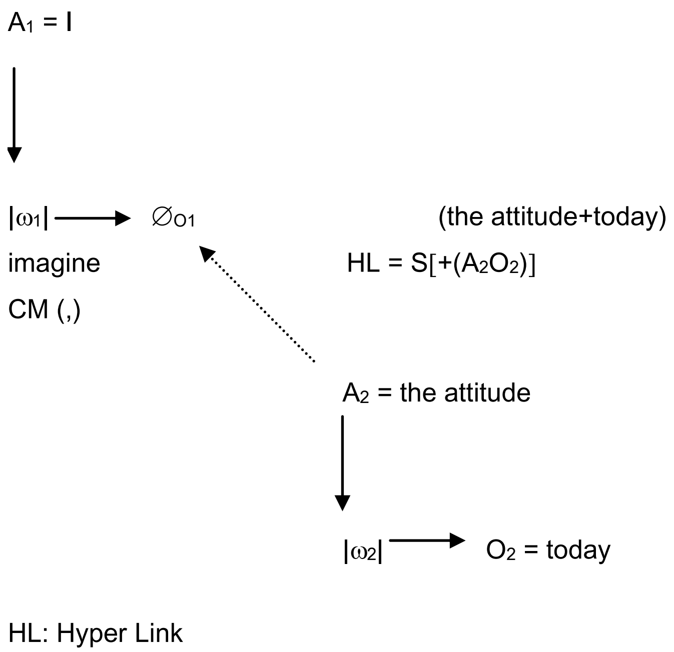

Figure 1 *Equilibration of a cascading flow with one place-holder*

From the processing point of view, the demonstrated displacement leads to a layered composite, namely (*the attitude + today*), which is closing the propagation of the dummy. The angle at each component possesses an equal and positive charge, while the dummy (=edge) is associated with a negative charge. In balancing out the edge by charging the negative (-), the process of equilibration is resulting in the composition of a “trivial centre” (Changeux & Connes, 1995, p. 136). In this sense, triviality can be equated with redundancy (Hestenes , 1986/1993, p. 68). In its entirety, the AaO-configuration “exhibits relatively little expended elasticity” (Yakobson & Smalley, 1997).

In expanding the previous text example into (*I would imagine, the attitude is today…*) a more complex AaO-coupling may be formalised with Expression (6).

$$(\mathbf{A}a\varnothing_{O}, \varnothing_{A}a\varnothing_{O}, \varnothing_{A}a\mathbf{O}) \qquad (6)$$

The resolution of (6) requires that at least two differently materialised components (**A**) and (**O**) become approachable and must appear between the first and the last component. Thus, raising the number of joints to (J=3) will immediately increase the number of neighbouring links to (L=6). But the co-ordination of the two trivalent components, contained in Formula (6), evolves from the fact that the number of vertices (V=7) minus the number of joints (J=3) plus the number of links (L=6) is equal to the number of slants (K=10). Hence, its equilibration can be summarised as follows

$$(7V–3J+6L = 10K) \qquad (7)$$

The geometrical computation to the equation (7) is demonstrated in Figure 2. The graphical solution is immediately confirming the centralising power of the three interacting AaO-units.

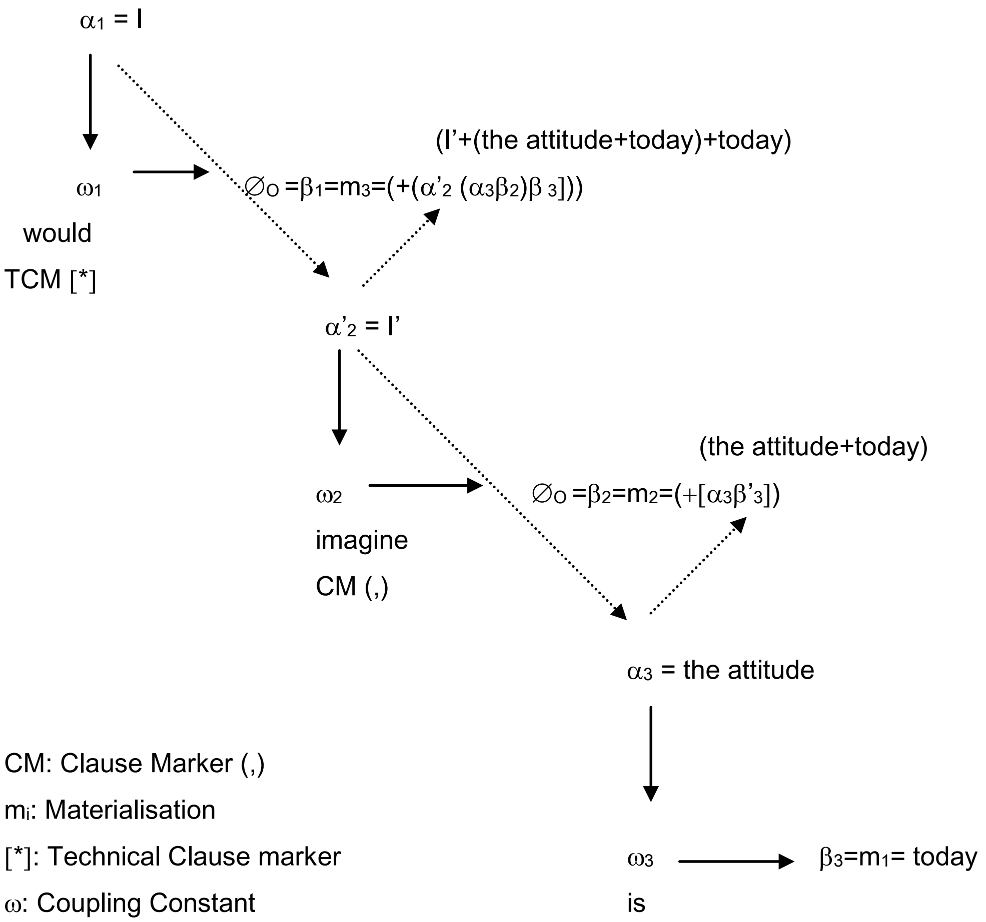

Figure 2 *Equilibration of a cascading flow with four place-holders*

Only the Euler-theorem can postulate its exact solution (Hestenes, 1986/1993, p. 404). The advantage of using Euler-angles surface-oriented is that every rotation can be reduced to the product of a rotation about the (a) axis of the AaO unit, which provides the standard basis for the rotation (Hestenes 1986/1993, p. 289). When a certain number of rotations through the Euler-angles have been processed, the product appears as "multiplicative redundancy".

Moreover, on the basis of length, an extensive dislocation shows that a physical measure on neighbourhood requires that neighbourhood can be made evident (B. Bierschenk, 1993b, c). Within a certain period of time, several pentagons and heptagons or even decagons (Wales, 2003, pp. 12-13) may be responsible for the development of HL's. What is changing during the development of an evolutionary path, are the turning circumstances and the placeholders through which various A- and O-components are interacting and embedding the produced composites. Moving a segment of text over several fields means that the flow-fields themselves are excluded from integration. Demonstrated is an extensive move, which dislocates the variable (α) a certain number of steps and is copying it in order to transfer it in the form of multi-layered composites of increasing complexity. Moreover, the displacement of composites over certain distances makes evident that the producer of a change is the coupling verb-function. However, in a surface oriented processing, the latter cannot take part in the required displacements.

Channelling by eliminating the ($\varnothing$) at a succeeding or preceding level means that the copying process leaves the trace of a rolling sheet. For example, when the (β_3) variable in the decagon of Figure 2 is moving in the reversed direction, a sheet of covering is rolled into the

place that is marked by (m_2). Further processing requires first the enrolment of the variable (α_3) in order to establish the composite at (m_2). Then, the resulting sheet is rolling into the preceding covalent place, where it coherently can land as the composite (m_3).

As represented by the (α) variable in Figure 2, the moving point of observation is determined by the specification contained in the kinematic trajectory. Moreover, stable points as well as non-stable points are reciprocally specified. By means of circular causation, and recurrent establishment of co-operative interactions between the (α) variable and the (β) variable, cascading flows are producing flowing text segments. This means that their processing becomes topologically specified. It follows that functional changes make the point of observation as well as the point of view two-fold dependent.

Moreover, in Figure 2 it is obvious that self-reference, by means of a copying process, is a natural part that can stretch over several segments of text, which makes the involved rotations heavier as more and more copies become integrated (i.e. become involutes). Without this kind of self-reference, it would be impossible to determine the involution of a textual flow. It follows that single composites are organising themselves in hyperbolic spaces, which are negatively curved. By definition, negatively curved spaces are hyperbolic at any level and require that ordinary geometry is replaced with what has become known as non-commutative geometry (Cho, 2000; Connes, 1994; Greene, 1999, pp. 379-380; Hestenes, 1994, p. 66). Corresponding characteristic properties of angular articulation can be extracted from the dynamics of the gradients, which are emerging below in Figure 3.

Spitting and Splicing

The procedures for componential splitting and splicing have been established previously (B. Bierschenk, 2001a, b) and will be explained with reference to the configurations of the Figures 3 and 4.

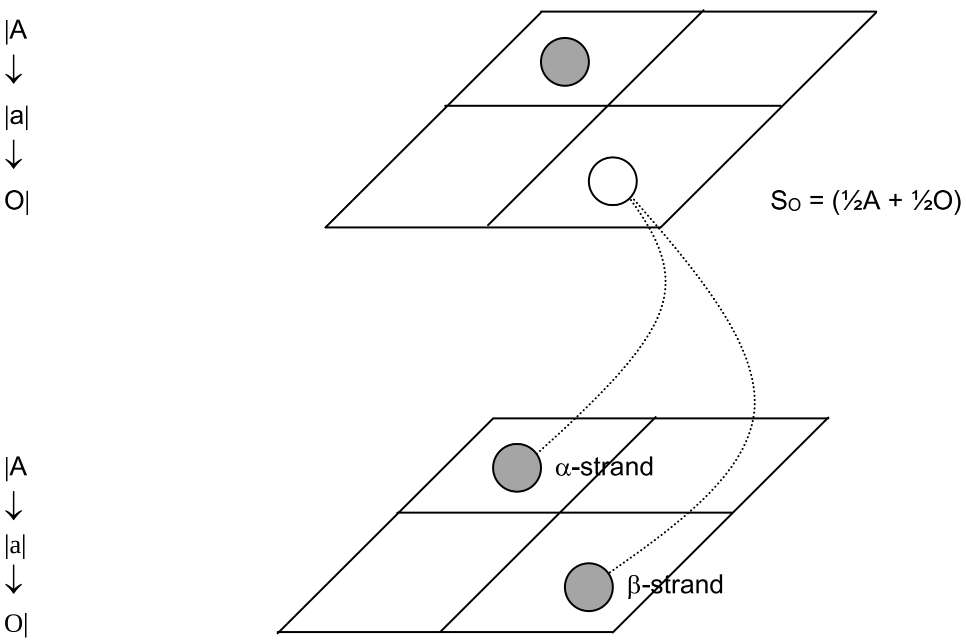

Figure 3 *Splitting into componential states*

As can be seen from Figure 3, their operations involve a twining in the β-strand. The meaning of a twining operation is as follows:

> The placeholder ($\varnothing_O$) indicates that a complete (A-O) composite is needed, which would close the dummy (=peephole) with a sheet of texture. Therefore, the Supplementation (S)-function is starting cyclic and pendular movements. But the clock-like displacement of the O-component requires that the Pendle moves first one turn clockwise. This turn is thereby establishing the degrees for unity, which has the magnitude of (U=1spin). But to complete the displacement cycle, the Pendle must initiate a counter-clockwise move with a spin of (≈½), which is closing the dummy, however only partly. This implies that the component on the β-strand would be associated with a text segment of insufficient cover. To complete the closing operation, the S-function requires also that the Pendle of the A-component is making the same kind of moves. In returning its outcome, the component on the α-strand becomes associated with the missing part of cover. The latter operation is closing the dummy in its entirety. It follows that the magnitude of the produced rotations is the result of two states of spin. Since [≈½α-spin+≈½β-spin] amounts to (U=≈2*½-spin), this magnitude can be equated with the rotational displacement of the roots of a unity (U), i.e. the roots of the second AaO-unit, namely the A-root and the O-root. The peephole at the textual level would have to be mended with a two-fold layered sheet of texture.

The essential first step in the componential splitting concerns the “holonomic” state (Bayer, Hawrylak, Hinzer, Fafard, Korkusinski, Wasileswski, Stern, & Forchel, 2001; Lloyd, 2001) of a dot. For example, in associating relaxed and non-relaxed states with the dots, it becomes possible to make the state of a particular kind of components knowable. It follows that the basis for the calculation can be determined directly at the ecological level through the A- and O-spinors. This means that the un-normalised A- and O-components are eliminating the “computational cost of normalisation” (Hestenes, 1994, p. 72). Further, by using the components directly, the demonstration is significantly simplified.

Intermittent phase transitions are constraining the rotational speed of the variables on a particular strand. This kind of constraints is producing splicing through twisting strands on which the movement of the variables can be observed as accelerations on evolutionary developing strands. As shown in Figure 4, the notion of a Pendle can be used once more with the purpose to determine the degree of twisting of the composites.

For example, if a component is in a non-relaxed state and this state is associated with a filled dot a distinction can be made in relation to a component in the relaxed state, associated with an unfilled dot. From a kinematic point of view, it can be stated that the A’ and O’s at the left-hand side allow for the determination of the orientation in the rotational behaviour of the dots. However, when two borders are defining the directedness in a rotational transition, the dots are operating in certain areas of the flow-fields. Since the areas of an AaO-unit are incorporating definite borders, the AaO-unity (U) is embracing spherical properties. But the determination of the orientation of the dots’ rotation within the spherical space of an AaO-unit is only achievable through their bonding to the A’s and O’s.

By letting the bookkeeping device update the effects of the rotating dots, updating is generating a manifold of novel super symmetries. Since they are the consequences of the processed spinors, with respect to the emerging space, these symmetries have important implications for the splicing-hypothesis. A definite outcome of the processing is the detection of the mono-layered composite in the position of (A_1) and (∅) in the positions of (A_2) and (A_3), which are initiating the necessary channelling operations. The corresponding second order structures are initiating the processing cycles of the variable on the α-strand. The corresponding stepping function is associated with the text segment (*Most people*). In turning to the next following position, it becomes necessary to activate the S-function. Its task is to

Evolution	*Development Text*
↓	
	Most
A_1	people
a	would
O_1	∅
↓	
	,
A_2	∅
a	like
O_2	∅
↓	
to	
A_3	∅
a	go
O_3	home

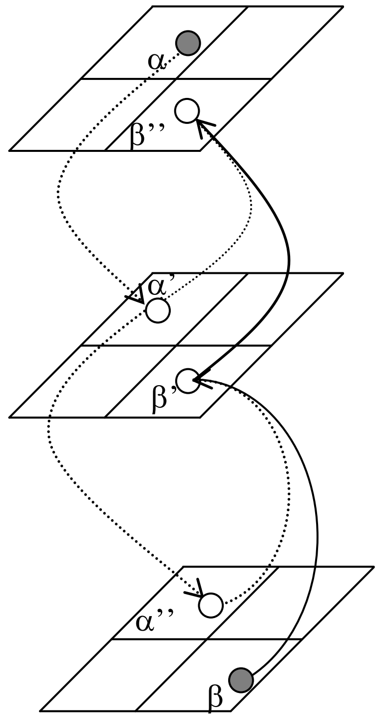

Figure 4 *Production of an expanded ring structure*

copy the text-segment and rotate it into the position of (A_2). This action is resulting in a twist in the α-strand which however leaves the grapheme pattern unaffected. Hence, reiteration implies a sliding in the path of the moving variable, which is indexed with (α’). Moreover, as shown in Figure 4, it is obvious that exactly one value is associated with each step in the twisting of a strand. The course of the movement shows that rotational distance is increasing with growing W-numbers. As demonstrated through the developing path, the thermodynamic work is performed according to the relation of Expression (8):

$$[A_2 = W_{\alpha'} - (\sqrt{A_1})]. \tag{8}$$

When the same kind of operation is applied to (A_3), it becomes evident that (α’’) is maintaining the course over the involved flow-fields. Corresponding changes in the depth of sliding on the kinematic path are developing into a forward-oriented shade.

But the twisting in the strand appears in the relation of Expression (9):

$$[A_3 = W_{\alpha''} - (\sqrt{W_{\alpha'}} + \sqrt{A_1})]. \tag{9}$$

Besides marking the twisting in the expression, re-iterative copying of the original (α) implies a decrease in magnitude, which is expressing a certain degree of fading. At every step in the re-iteration, the function is responding with the output of a magnitude, which may change its sign with an increase in fading. As represented by the (α) variable, a moving point of

observation is contained in the kinematic path and determined by the specifying shadows. Moreover, stable (i.e., solid) as well as non-stable (i.e., shadowed) points, as demonstrated by the re-iterative copying operations, are reciprocally specified.

To restate: By means of the copying process, it is made evident that self-reference is a natural part that can stretch over several flow-fields, which makes the involved clock to tick slower the heavier the twisting becomes. By measuring this kind of self-reference, the involved rotational transformations are determined and make single composites organise themselves in a twisting space, which is negatively curved.

In contrast, surface-oriented channelling through the ($\varnothing_O$) means that the reiteration process leaves the trace of a sinking text-segment. Applied to Figure 4, channelling shows that the S-function has detected a mono-layered segment, namely *(home*) in the position of (O_3). In capturing the consequences of the gating of the β-strand, the variable must be lifted into the neighbouring position, which requires a counter-clockwise rotation into the immediately preceding position. This capacity of the S-function is related to backward shading. In turning to (O_2), it can be made obvious that a copy of the text segment is required as filament. Since the needed complementary part of the filament is associated with (α''), the variable must change site in order to cooperate and become an integrated part of variable (β'). This kind of functional change appears as twining, resulting in the relation of Expression (10):

$$[O_2 = W_{\beta'} – (\surd O_3 + (\surd W_{\alpha''} + \surd W_{\alpha'} + \surd A_1))]. \qquad (10)$$

Obviously, the shades of a point of observation are manifesting changes in the direction of focus. The S-function is merging the result with the shades of the point of view. However, winding the shadow associated with the resulting variable-composite into the position of (O_1) is not sufficient, since the operational condition calls for the shadow associated with (α'). This condition is captured in the relation of Expression (11):

$$[O_1 = W_{\beta''} – ((\surd W_{\beta'} + \surd O_3) + (\surd W_{\alpha''} + \surd W_{\alpha'} + \surd A_1) + (\surd W_{\alpha'} +A_1))))]. \qquad (11)$$

Here, it can be re-observed that twining makes the overlapping shadows of the (β'') variable two-fold dependent on the α-strand. Furthermore, (α) is crossing several times which accentuates the shadow-like appearance in the O-component. The result corresponds very naturally to the computation of different kinds of changes in direction and orientation, which develop on the basis of shadow-like (i.e., soft-moulded) overlaps and repeated couplings of the β- strand with the α-strand. These phase dependencies constitute the basis for the operational definition of the concepts of speed and acceleration in the expression of geometric distance.

As shown in Figure 4, the strands are gating the production of variables. Since these are associated with the textual patterns, variable transformation implies that the spinors rotate the patterns in the counter-clockwise direction. Thus spinors are operating on flow-fields. The significance of the flow-fields is founded on the hypothesis that the distance between the planes of Figure 4 is always (d=1), but that the winding (W) numbers are generating the geometrical properties of a path.

It is an important result of the discovered mechanism that the flow-fields of a functional clause have helical properties. But it is the AaO-unit that constitutes the fundamental prerequisite for the establishment of the flow-fields. Fields are functioning as the coupling links between various appearing textual activities, such as the expression of textual agents and textual objectives. The field properties become evident when the processing of the α- domain as well as the β-domain of an entire field shows preferred winding-directions.

First Level Processing

The first level of processing always concerns the textual surface. Since the development of structure requires that every Functional Clause (FC) in its reproduction must consist of the same AaO-information, structure develops as a consequence of the fact that a textual event at one place differs more or less from the event occurring in a neighbouring place. The way in which information flows appear in the context of natural language production has been captured through the [AaO-FC-AaO] transcription factor (B. Bierschenk & I. Bierschenk, 2003). This factor constitutes the foundation for the observed messengers and the developed FC procedures. The ability to trace movement patterns with FC comes from the observation that the (A) as well as the (O) component is contributing to the formation of bonds. Bonding implies that the biologically working machinery is establishing the correct entanglement of the components and consequently the permissible neighbourhood in a given textual environment. Finally, the geometric capacity of FC will be used to demonstrate how phase dependent textual movement patterns are modulated. However, before strings of graphemes can be identified and analysed, instructions for editing the textual elements of a given text need to be outlined.

The notion grapheme and the notion string as a sequence of graphemes, i.e., a ‘graphical word’, are used to refer to the alphabetic or numeric characters between two spaces:

(1) a string of grapheme includes numbers,
(2) the graphical word includes numbers with decimals,
(3) a juncture of strings is identified with right-sided spaces only,
(4) a juncture of strings has the function of a graphical word,
(5) for the sake of clarity, a juncture is marked with a left-sided space.

Thus, a graphical sentence, represented by a text segment, requires as a first measure the identification of its boundaries and the producers of change, which are the verbs. Thereafter, textual agents and textual objectives can be established procedurally. In transcribing the AaO-components at the textual surface level, it is helpful to reflect FC with codes. This has been achieved with the pattern of Table 1.

Table 1.
The Codes of the Functional Clause

SM	00
CM/TCM	01
Conditional Agent	10
Experiential Agent	20
Unconditional Agent	30
Verb (ω)	40
Objective	50
On-objective	60
With-objective	70
For-objective	80
Phrase	90

The distinction of a FC, based on naturally occurring clause markers (CM) or the insertion of a technical clause marker [TCM], is achieved with reference to the given codes.

In general, the differentiations in the O-component are processed on the basis of non-prepositional and prepositional objectives. The latter have been identified with the succession of their evolutionary appearance according to the following prototypes {on, with, for}. Thus, the AaO-formula has a governing as well as a controlling function in the cyclic processing of a textual expression. During processing, the AaO-formula is transcribed with FC. The latter is controlling the radius of single textual agents and textual objectives. Evidently, a number of work cycles (κ_i) have to come about after a matching verb (ω), consisting of materialised textual elements, which have to be identified. Furthermore, in the processing the radius is controlling (κ_i). It follows that a cycle concerns the rhythmic operations of FC. It determines to various degrees the scope of the involved textual agents and their objectives.

Furthermore, some dictionaries are needed for identification purposes. An advantage of the identification procedures is that they have the capacity to represent a hierarchy of codes. But the beginning of text processing is always identified with checking for the presence or absence of sentence markers (SM) and clause markers (CM. The demarcation of a time period is performed with reference to the corresponding dictionaries, which carry the codes in the interval from 00 to 90. The codes allow for the denotation of direction by tens and for the denotation of the organisationally bound orientation by units. The dictionary for the demarcation of a period (Code 00) contains the grapheme strings {. ? !}.

The markers of a fraction of a period (Code 01) denote a distinct and identifiable time span. Typical of this steering component is the time interval with which certain elements become materialised. The following example CM-dictionary contains a number of naturally occurring strings of graphemes for Swedish {, ; : - att då eller hur men och som så vad varför} and their English counterparts {, ; : - that when or how but and which so what why}. To reiterate, the textual objectives searched for can be either non-prepositional or preceded by prepositions (i.e. the preposition is the first string of a sequence). The dictionaries of prepositions include spatial prepositions (Code 60), instrumental prepositions (Code 70) and intentional prepositions (Code 80). Swedish examples of spatial prepositions are: {av bland från hos i på till} and English {of among from at in on to}. Examples of instrumental Swedish prepositions are: {med via genom} and English {by via with through}. Finally, the intentional preposition (Code 80) is the Swedish {för} and the English {for}. The coding of the pointer function of the prepositions and their evolutionary foundation can be studied in I. Bierschenk (2011, p. 19). In the cases where a string can be both a CM and a preposition, an algorithmic procedure transforms it to the most proper function, as for example the English preposition {to}, which is changed into a CM (I. Bierschenk & B. Bierschenk, 2011, p. 8).

The Verb-function (Code 40) preserves the directedness in the processing. The verb-function is the producer of a change, which is associated with a distinct and identifiable string of graphemes. At the surface level (first level of processing) those strings make up the standard base. For processing reasons, the verb dictionary (Ω) implies that the strings are marked with (ω). In multiple environments or throughout a given process in the algorithmic coding, (ω) designates a condition that cannot remain unchanged. The criteria set up for defining verb strings are that

(1) the string shall be identified as a stem or a stem plus an inflected suffix belonging to the finite or infinite forms,
(2) an auxiliary (e.g. 'is') shall be regarded as independent verb,
(3) identification shall be based exclusively on intra-string matching.

The following form categories, valid for Swedish, may be illustrative: Imperative (titta = look); Present tense (tittar = looks); Preterite indicative (tittade = looked); Preterite

conjunctive (sutte = sat); Infinite (sitta = sit); Present participle (sittande = sitting); Perfect participle (motiverade = motivated); Supine (tittat = looked).

The consequence of the third criterion is that the participles in the nominalizations (‘de … anställda’; ‘the … employed’) are not considered as nouns but verbs. The three criteria together reflect the position that the active voice of the verb is the primary one. Experiments with texts have shown that there will be textual relationships missing, if the nominal sense is given priority. The intra-string criterion also holds for the passive verb, i.e. the inflected s-form in Swedish. What is required for the definition of direction in the processing is a function, which keeps track of the number of steps (κ_i) within a particular period or fraction of a period. The instructions for the stepwise processing are the following:

(1) Identify all kinds of verbs and assign the Code 40.
(2) If at least two verbs are enclosed within a SM and a CM or two CM, separate the verbs.
(3) Insert the TCM between the verbs (e.g. Swedish ‘att’; English ‘that’) and add the dummies for their textual agents and objectives. In practice the symbol (*) is used.

The basic property of this procedure concerns the placeholders of the A- and O-components, which are the dummies ($\varnothing$). Any time a new phase is initiated, mechanical processing becomes reactivated through cyclic returns. Hence, dummies for those places where strings of graphemes are missing are governing necessary compensatory moves and corresponding transformational processes become reversible. In this operation, the dummies must cooperate, i.e., be covalent, in their control of the textual development.

Finally, the ($\varnothing$) function is independent of whether one conceives the mechanism as ideal or material or whether one assumes that its routines operate within Euclidean or non-Euclidean space. Since the production manner of the AaO-mechanism can be formulated within the framework of rotational dynamics, it has to be conceived of as an abstract machine. Hence, the only important thing is that the mechanism shows a machine-like behaviour, conformable to natural law. Because the operational closure of FC is producing the emerging solutions, an analysis of the produced equilibrations must necessarily lead to qualitative statements about emerging symmetries.

It is an important result of the discovered mechanism that the flow-fields of FC have helical properties. But it is the [AaO] unit that constitutes the fundamental prerequisite for the establishment of a verbal flow-field. This field is functioning as the coupling link between various appearing textual activities, such as the expression of textual agents and textual objectives. The field properties become evident when the processing of the A-part as well as the O-part of the entire field shows preferred winding-directions. The operating processes are confined through the Functional Clause (FC), which is capturing the produced pattern dynamics according to the following expression:

	SM	verb	SM
FC =	$\vert . \rightarrow$	$\vert v \vert$	$\rightarrow . \vert$
	A-field	$\vert a \vert$	O-field

Figure 5 *Flow-fields of the Functional Clause*

The (A-O) borders are governing the periodic behaviour of the [AaO] units. These borders embrace the spherical property of FC much like a belt. In order to determine the proper messenger, it is necessary to determine the intersection with another border, i.e., the ω-function, which determines the dorsal-ventral border. In other words, the dorsal/ventral and the A/O-intersections appear always in pairs.

Second Level Processing

At the second level of pattern processing empirically defined messengers are emerging. Therefore, they are treated as second order patterns which are characterised by local properties. These properties are communicating the steering and control conditions of the FC. The rotations of the messengers are reproduced in Table 2.

Table 2.
The empirically defined messengers

Left-hand Side of FC:	*Radian*[1]	*Supplementation Operation*
A = Before the Verb	*[iϕ/2]*	
(1) $SM_p+\varnothing_A+\omega$	0.000	Paragraph start: Insertion of Variable (X)
(2) $SM+CM+\varnothing_A+\omega$	0.785	Sentence start: (X)+Horizontal integration
(3) CM+Phrase+ω	1.570	(X)+Horizontal integration
(4) CM+Prep+Word +ω	2.360	(X)+Horizontal integration
(5) Word+ω	3.140	Sequence
(6) Word+Prep+ω	3.870	Sequence
(7) Word+Prep+ …+ω	4.710	Sequence
(8) $CM+\varnothing_A+\omega$	5.500	Vertical integration of previous α-variable
(9) $SM_s+\varnothing_A+\omega$	6.280	Sentence start: Vertical integration of previous αβ-pair
Right-hand Side of FC:		*Supplementation Operation*
O = After the Verb	*[iθ/2]*	
(1) ω+∅+SM	0.000	End of sentence: Insertion of Variable (Y)
(2) ω+∅+CM+Phrase+CM	0.785	(Y)+Attachment of Phrase
(3) ω+Prep+∅+SM	1.570	Insertion of Variable (Y)
(4) ω+Prep+∅+...+CM	2.360	(Y)+Horizontal Integration
(5) ω+Word	3.140	Strictly Ordered Sequence
(6) ω+On-prep+Word	3.870	Partially Ordered Sequence
(7) ω+With-prep+Word	4.710	Partially Ordered Sequence
(8) ω+For-prep+Word	5.500	Partially Ordered Sequence
(9) ω+∅+CM	6.280	Vertical integration of following αβ-pair

[1] The measurement in radians is given by [arc $\alpha = 2\pi(i\phi/360)$] and [arc $\beta = 2\pi(i\theta/360)$]. Hestenes (1986/1993, p. 75) emphasises that the exponential function and its series expansion requires that angle is measured in radians. SMp: at the beginning of a sentence; SMs: at the beginning of a paragraph

In order to be able to observe the displacement operations, it is necessary to determine intersections. The first component appears alongside the border of the A-field. The other is the O-component, which appears at the lower border. The dorsal-ventral and the A/O-intersections appear always in pairs. Both have contrasting as well as complementary functions. The borders (|) of its A- and O-field embrace the spherical property of “intrinsic” as well as “extrinsic” curvature (Wisdom, 2003, p. 1867).

With the realisation of the cyclic working mode of the AaO-machine, now, the goal is to discover the informational flows and the way in which FC is driving the flows. Therefore, the focus is on the way in which the messengers are structurally rooted in the textual environment. The first (A) is always appearing at the left-hand side and the other (O) on the right-hand side of (ω). Both have contrasting functions:

(1) Calculation and supplementation of the placeholders of the A-component follows from top and downwards.

(2) Calculation as well as supplementation of the O-component is performed from below and upwards. This explains the pair-wise extremity as well as its symmetry.

Moreover, different degrees of complexity concern the integration of strings of graphemes into super strings, namely (α) and (β). In this sense, the complexity of a super string is always locally defined. Hence, the transition from strings of graphemes to super strings or variables proceeds over the sequencing space and into the production space of the super strings. Therefore, geometric layering of a textual segment is the result of the introduction of a particular kind of string processing, which is producing either alterations of existing strings of grapheme or new sequences.

Thus far, the messengers have been concerned with the process of developing an efficient procedure for the processing of the complexity involved in the manipulation of strings and strings of graphemes. But the following rules have been set up for a refinement of the (A-O)-borders of the flows in a cyclic manner:

(1) If a SM follows an (O), connect the 00-string to the (O) and add string-value.
(2) If a CM precedes an (A), connect the 01-string to the (A) and add string-value.
(3) If a CM follows an (O), connect the 01-string to the immediately following (A) and add the string-value to the A-value. Repeat this procedure for two or more CM.

The last three instructions concern the rotations at the FC-borders, which are producing the subtleties of pattern dynamics. Most significantly, the instructions underline the expression of varying borders. Through the localisation of realised strings of graphemes and the determination of their super string properties, it is possible to show that super strings are always complementary and are established through displacement operations, which are leading to composites.

To make sure that the continued processing detects all functional clauses, even those which are not marked, *(Agent + Verb + Objective)* defines the kernel. A functional clause shall have a verb (only one!) and one or more strings before it and after it. If no strings are present before or after, a dummy ($\varnothing_A$; $\varnothing_O$) is inserted to mark the missing string, which at a later stage will be substituted with specific information. The dummies can be substituted with (*) in the processing practice (I. Bierschenk & B. Bierschenk, 2011).The pattern controlling this process is shown in Table 3. The working of the functional clause can be observed below in Table 5.

Table 3
Functional clause

Code	*Function*
01	CM
30	$\varnothing_A$
40	**Verb**
50	$\varnothing_O$
01	CM
30	$\varnothing_A$
40	**Verb**
50	$\varnothing_O$
01	CM

Third Level Processing

A textual surface is related to the folded specificity of neighbouring grapheme or grapheme-sequences. Geometrically conceived, they have a share in a particular variable. This stipulation is accounting for spiralling structures and the recovery of the intentional dynamics put into text. To recover the underlying rotational (i.e. attitudinal) changes stepwise without intervening dissociations and in perfect order implies the application of the general pattern, outlined in Table 4.

Table 4.
Winding strand

Pattern	*Property*	*Magnitude*
Messenger	Virtual	Basic value 1/1
+ Word	Physical	Curling value 1/10
+ Grapheme	Material	Valve value 1/100

In computing the rotation of a developing composite or layered variable, the involved super string rotations are carried out in agreement with the pattern of winding strands: The magnitude of the winding (W) of the virtual strand is taken as basis (W=1/1).

(1) Every layered segment of this strand is treated as an expression of the resonating property of a variable. Since it is an expression of the strand's contextual circumstances, its surface-oriented curling plays a complementary role.
(2) The magnitude of curling is accounted for by adding the fraction of (W=1/10). The curling-value is added to the basic winding-value of the strand.
(3) In addition, the magnitude of a valve-fraction is computed as of (W=1/100). This is the contextual fitness-value, which is multiplied with the number of participating graphemes.

To repeat, geometrically, the share in the prismatic textual surface is related to the resonating property of the neighbouring grapheme sequences. A developing grapheme sequence lowers the short-distance sensitivity of a strand and thus is increasing its resonating capacity. Furthermore, to take into account the fundamental implications of a pattern implies an efficient geometric basis for the observation of string movements and the description of their pattern dynamics with the help of spinors.

Spinors have an unusual property. There are two of them for each string rotation. The first spinor (I) always turns counter-clockwise (CCW), and specifies the negative direction in a rotation through the complementary angle ($2\pi - \theta$). The placeholders ($\varnothing$), signal the clocking mode of components that stands wide open. The activation of spinor (I), is initiating a change of direction with a spin of (-1). However, the second spinor (II) is turning clockwise (CW) through a certain number of degrees and is thereby specifying orientation and acceleration. The two-valued-ness of spinors is needed to address selective string movements. Hence, spinor (II) has the task to define precisely a string's position at the event horizon. This means that the two spinors are working together in order to produce rhythmic and clock-like pendular movements, which are generating unique geometric string properties.

A concrete example, given in Table 5, demonstrates the computational procedure, which is reiterated for every segment of a strand.

Table 5
Spherical dependency of layered composites

Textual Surface	*Integration Pattern*	*Winding Value (1/1)*	*Curling Value (1/10)*	*Valve Value (1/100)*	*Vertex Radians*
[.]					
Most	Pattern (A5)		0.314	0.0314⊗4	0.4396
people	α_1		0.314	0.0314⊗6	*0.5024*
		+3.14			3.14
					ϕ=4.082
would	Pattern (O9)		0.628	0.0628⊗5	0.942
$\varnothing_O$		+6.28			= 7.222
	β_1 = (+(α_2)[$\alpha_3\beta_3$]))				θ=-8.74089
[*]	Pattern (A8)				
$\varnothing_A$	α_2	5.50			ϕ=3.479604
like	Pattern (O9)		0.628	0.0628⊗4	*0.8792*
$\varnothing_O$	β_2 = (+[$\alpha_3\beta_3$])	6.28			*=7.1592*
					θ=-1.76242
to	Pattern (A8)		0.550	0.0550⊗2	0.66
$\varnothing_A$	α_3	5.50			*=6.16*
					ϕ=1.794396
go	Pattern (O5)		0.314	0.0314⊗2	0.3768
home			0.314	0.0314⊗4	0.4396
.			0.314	0.0314⊗1	*0.3454*
	(β_3)				*1.1618*
		3.14			θ=*4.3018*

⊗ = Multiplication
[] = Technical Markers

In order to make the rotation of strings evident and to catch the import of rotational dynamics, the existence of spherical spaces becomes evident through string production. With examples for the A-component and for the O-component respectively, spherical dependency is illustrated.

Through the clocking mode in the determination of the degree of rotation in string displacements, it is possible to demonstrate that a string must have a direction and an orientation towards a unique place. The condition that a certain move must relate to a particular place is generating pattern movements, which require the involvement of advanced stepping functions. Based on the clocking mode of the AaO-mechanism, it can be concluded that clocking relates the super strings of (α) and (β) in a strict systemic sense.

In establishing the clocking mode of the strictly coordinated A- and O-components, the magnitude of (–2) is a definite determination of the verb-function (ω), however in the context of the pair-wise absence of the super strings. This is the formal definition of a virtual string of zero magnitude. The first Spinor (I) is defining the condition with a spin of (–1). The corresponding turn of the second spinor (II) is showing that the curling of any 'virtual string' does not stop. If curling does not stop, i.e., it is unconstraint, there is a need for dislocation, since any slot has to be closed and any position has to be filled, with either (X) or (Y). When a dislocation appears at a dislocating edge and it satisfies the requirements put by an incomplete or a deflated unit, for example [$\varnothing_A\omega\varnothing_O$], the first component is supplemented with the variable (X), the second component takes variable (Y) while (ω) constitutes the formal operator. Hence, the expression [X is Y = 0] makes no sense.

The O-component

However, when “is” operates as verb-string, some rotational movements along the unit’s ω-function must come into existence. Vertical processing occurs at the edge of an extra gliding plane (see Fig. 3), which has to be shoved in like a smooth area that allows the vertical gliding of textual segments. Thus, if a verb has been materialised, a specifying orientation may come about. This is illustrated through the first pattern of the O-component. In commenting on the presented case, it can be stated that shifts in orientation require accountability. Hence, the orientation, associated with the expression of a textual objective must take the verb into account. Thus, absence of a verb would mean an unknown shift in direction, which implies that nothing has been expressed.

In the presence of a verb, the insertion of this Y-variable conforms to a magnitude of zero, which marks the circumstance that the cooperation between a textual objective and its local context is undiscoverable. Therefore, the expression of the verb must be considered with respect to its limits.

Verb+Dummy+Sentence Marker (O1)
[CCW: (1); CW: (8/8+…)]

Code	*String*	*Radians*	*Sum*
40	imagine	0.533800	
50	$\varnothing_O$	0.000000	
00	.	0.345400	
			.8792000

Besides marking a directional change and the acceleration due to this change, no other procedures can be carried out in order to stop the curling of the string.

It follows that the ω-function is changing the point of orientation radically and a spin of (+1) becomes the primary result. The example makes explicit that direction and orientation can change in important ways. According to the law of simultaneity the verb rotates into a position on the orbit of the O-component. Furthermore, this condition allows the computation to express complete openness, however coordinated with an explicit expression of a shift in orientation. Pointing to a particular type of objectives always takes place within a local context. Therefore, the necessary operation is changing the present 01-Codes into 90-Codes and the entire phrase is thereafter absorbed by the Dummy of the 50-Code. This particular case is shown in the second pattern.

Dummy+Clause Marker+Phrase (O2)
[CCW: (7/8); CW: (1/8+…)]

Code	*String*	*Radians*	*Sum*
40	imagine	0.133450	
50	$\varnothing_O$	0.000000	
01 (90)	and	0.102050	
01 (90)	local	0.117750	
01 (90)	plans	0.117750	
01 (90)	as	0.094200	
01 (90)	description	0.164850	
00	[.]	0.000000	0.730050
			0.785000
			1.515050

The identification of variable objectives requires that different types of textual objectives are discernable. The placeholder of (2) implies that a phrase is following immediately after the verb. However, when the objective is not explicitly stated, at the position ($\varnothing_O$) there is no change to be observed.

The preposition in example (3) is next to the verb, although from the conceptual point of view it is in close relation to an unknown event. Therefore, the example is treated as a constricted perspectivation. It may be preceded by a 50-Code, but no other text segment is following.

Preposition+ Dummy+Sentence Marker (O3)
[CCW: 6/8); CW: (2/8+…)]

Code	*String*	*Radians*	*Sum*
40	go	0.188400	
60	on	0.188400	
60	$\varnothing_O$	0.000000	
00	.	0.172700	0.549500
			1.570000
			2.119500

In example (4) a preposition is followed by a CM, and is thereby initiating a series of verb-less strings. The example demonstrates a phrase, enclosed by CM, which is substituting the placeholder. The following calculation applies:

Preposition+Dummy+ … +Clause Marker (O4)
[CCW: (5/8); CW: (3/8+…)]

Code	*String*	*Radians*	*Sum*
40	Count	0.354000	
60	on	0.283200	
60	$\varnothing_O$	0.000000	
01 (90)	,	0.259600	
01 (90)	the	0.306800	
01 (90)	security	0.424800	
01 (90)	maybe	0.354000	
00	[.]	0.000000	1.982400
			2.360000
			4.342400

A textual segment, following the verb without a preposition in front of it, is next to the verb and in direct focus. This case is demonstrated with the example of (5).

Word (O5)
[CCW: (4/8); CW: (4/8+…)]

Code	*String*	*Radians*	*Sum*
40	become	0.502400	
50	a	0.345400	
50	specialist	0.628000	
00	[.]	0.000000	1.475800
			3.140000
			4.615800

Thus, any string of graphemes, except CM and prepositions, which appears immediately after the verb, is assigned the Code (50). Through the localisation of the realised strings of graphemes and the determination of their basic winding value, it is possible to show that its super string property is complementary to the A-component. If a preposition is preceding strings, which follow after any phrase construction, these strings get the Code of the proper preposition. The textual segments of (6) are marked with the preposition (60), which signals a spatial orientation.

60-preposition+Word (O6)
[CCW: (3/8); CW: (5/8+…)]

Code	*String*	*Radians*	*Sum*
40	go	0.464400	
60	to	0.464400	
60	a	0.425700	
60	specialist	0.774000	
00	[.]	0.000000	2.128500
			3.870000
			5.998500

Furthermore, it is important to note that changes in the pointer function of the prepositions mark measures of articulated changes in orientation. Concerning the individual development, which is exemplified in the example (7), it is pointing towards an instrumental orientation.

70-preposition+Word (O7)
[CCW: (2/8); CW: (6/8+…)]

Code	*String*	*Radians*	*Sum*
40	produced	0.847800	
70	with	0.659400	
70	milk	0.659400	
70	and	0.612300	
70	butter	0.753600	
00	[.]	0.000000	3.532500
			4.710000
			8.242500

When a textual segment is marked with the preposition (80), it points towards something very distant and at the horizon:

80-preposition+Word (O8)
[CCW: (1/8); CW: (7/8+…)]

Code	*String*	*Radians*	*Sum*
40	assure	0.880000	
80	for	0.715000	
80	everybody	1.045000	
80	random	0.880000	
80	examples	0.990000	
00	[.]	0.000000	4.510000
			5.500000
			10.01000

A change in direction implies elasticity. At the textual surface level, this elasticity can be reconstructed and extracted from the redundant properties of the corresponding supplementation, i.e. S-procedures. The placeholder of example (9) marks an open slot, which is attracting strings of graphemes.

Dummy+Clause Marker (O9)
[CCW: (1); CW: (8/8+…)]

Code	*String*	*Radians*	*Sum*
40	expect	1.004800	
50	∅	6.280000	7.2848 – (√3.9250+√4.4588) = 3.192100
		7.284800	
01	that	0.439600	
30	I	0.345400	
		0.785	
		3.140000	3.925000
40	have	0.439600	
50	my	0.376800	
50	salary	0.502400	
00	[.]	0.000000	4.458800

As soon as all strings of graphemes have become dependent on each other, the corresponding floating equilibrium has been reached. As a minimum this means that the super strings of a component are rotating with a certain orientation and are thereby meeting the super strings of a covalent component. Thus, whenever a slot is open, it is pushing towards closing.

How a floating equilibrium becomes accessible is demonstrated with the ∅=[Φ–(√ϕ+√θ)] operation of the AaO-mechanism. The proper processing requires the mechanism to resolve the language specific equations. With the point of reference in thermodynamics, movement signifies stability and loss of stability. Both are inherent in a sequence of evolving [AaO] units. But, the equilibration of the rotational string movement patterns makes evident the hidden capacity of the AaO-mechanism to transform a configuration of [AaO] units by means of hyperbolic links, which means that the single composites of the αβ-super strings are organising themselves in hyperbolic spaces.

The A-component

In the position before the verb-function, the absence of string orientation is computable. In case (1), spinor I is setting the acceleration to (ϕ = zero). Moreover, the example shows that spinor II marks the orientation with zero, which by definition means no orientation at all.

Sentence Marker+Dummy (A1)
[CCW: (8/8); CW: (8/8)]

Code	*String*	*Radians*	*Sum*
00	[.]	0.000000	
01	TCM	0.000000	
30	∅	0.000000	
			0.00000
40	verb		

However, any stacked phrase composition is defined as a verb-less string sequence, preceded or followed by a CM. The corresponding string rotations require a processing according to the second example.

Sentence Marker+Clause Marker+Dummy (A2)
[CCW: (7/8); CW: (1/8+…)]

Code	*String*	*Radians*	*Sum*
00	[.]	0.000000	
01 (20)	And	0.102050	
30	∅		0.102050
			0.785000
			0.887050
40	verb		

The marks (CM+∅) give some orientation background to experiential rotations. This state has been taken into account through the assignment of the Code (20). The CM of the example is activating Spinor I, which moves counter-clockwise with a spin of (ϕ=-7/8). But the controlling function of this move requires the Spinor II to turn clockwise into the position (ϕ=1/8). The process is thereby accelerating with the specified magnitude.

When a number of verb-less strings follow the CM, the formal relation appears as a phrase at the phenomenological level. A phrase at the beginning of a sentence is more complex, i.e., a heavier factor, which restrains the development of the angular articulation in agreement with the pattern shown in the third example.

Clause Marker+Phrase (A3)
[CCW: (6/8); CW: (2/8+…)]

Code	*String*	*Radians*	*Sum*
00	[.]	0.000000	
01 (20)	So	0.188400	
01 (20)	of	0.188400	
01 (20)	course	0.251200	
01 (20)	but	0.204100	
	∅		0.832100
			1.570000
			2.402100
40	verb		

Thus, the functional relations between the textual segments before the verb must be treated as a stacked composition. As a consequence the first string is turned into CM, which is restraining the sequence before the ∅ accordingly.

The pattern shows a lower degree in acceleration, since Spinor I is turning with a spin of (-6/8). This turn is establishing the new direction. In order to upgrade the orientation, Spinor II turns clockwise with a spin of (2/8). In essence, this is a specific change in the angular articulation and consequently the detection of the rotational contribution to the textual surface layout.

In the third case is the contribution in acceleration simply added. A conditionalised agent implies that the orientation is constraining the process. For that purpose, the CM-function, followed by a phrase construction, is embedding the agent. Hence, a variation in the constraining function is immediately tied to a verb-less string composition. The latter is

illustrated through Case (4), which concerns the expression of contextual circumstances. Processing and assignment of the proper Code (10) is demonstrated with the fourth example.

Clause Marker+Preposition+Word (A4)
[CCW: (5/8); CW: (3/8+…)]

Code	*String*	*Radians*	*Sum*
00	[.]	0.000000	
01	TCM	0.000000	
70 (10)	With	0.330400	
30 (10)	colour	0.377600	
			0.708000
			2.360000
			3.068000
40	verb		

The interplay between the movement patterns of (3) and (4) is emphasised by the double function of prepositions, which in the front of a clause act as CM, just like a CM at the end of a clause can act as preposition (compare the identification procedures.) In all other cases, where a string or sequences precede the verb unconditionally, functional cooperation can be computed, which means that the expression (5) becomes activated.

Word (A5)
[CCW: (4/8); CW: (4/8+…)]

Code	*String*	*Radians*	*Sum*
00	[.]	0.000000	
01	TCM	0.000000	
30	The	0.408200	
30	sunny	0.471000	
30	day	0.408200	
			1.287400
			3.140000
			4.427400
40	verb		

When the acceleration in the A-component is re-directed with a preposition, the variability of resulting textual depth relation brings out specificity which is illustrated in (6).

Word+Preposition (A6)
[CCW: (3/8); CW: (5/8+…)]

Code	*String*	*Radians*	*Sum*
00	[.]	0.000000	
01	TCM	0.000000	
30	Girls	0.580500	
60 (30)	with	0.541800	
30	red	0.503100	
30	hair	0.541800	
			2.167200
			3.870000
			6.037200
40	verb		

The movement pattern shows that the angular articulation in the expression has increased its structural complexity, and hence its rotation.

Differentiations in the A-component appear with the identification of two or more prepositions, which is illustrated further with the expression (7).

Word+Preposition+Word+Preposition+ … (A7)
[CCW: (2/8); CW: (6/8+…)]

Code	*String*	*Radians*	*Sum*
00	[.]	0.000000	
01	TCM	0.000000	
30	The	0.612300	
30	ship	0.659400	
70 (30)	with	0.659400	
30	the	0.612300	
30	flag	0.659400	
60 (30)	on	0.565200	
30	top	0.612300	
			4.380300
			4.710000
			9.090300
40	verb		

In order to establish the super string symmetries, a step is needed where the placeholders of the A-component are supplemented with reference to super strings, which can be transferred through copying operations. The sequential order between the marked pointers refers to the acceleration in the component. This kind of repeated self-indication is demonstrated in example (8).

Clause Marker+Dummy
[CCW: (1/8); CW: (7/8+…)] (A8)

Code	*String*	*Radians*	*Sum*
00			
01			
30	Work	0.439600	0.439600
			3.140000
			3.579600
40	refines	0.376800	
50	us	0.408200	
			0.785000
			3.140000
			3.925000
01	but	0.715000	
30	$\varnothing_A$	5.500000	6.215000
		6.215-(√3.5796)	4.323017
40	beautifies	0.628000	
50	rarely	0.502400	
01	.	0.345400	
			1.475800
			3.140000
			4.615800

The geometric capacity of FC makes obvious how phase-dependent textual movement patterns are modulated. The governing principle for the A-component requires that the operation of copying is starting at the beginning of a text. When these moves are combined, acceleration (or velocity of fading) is captured, which specifies the degree to which a particular super string is re-addressed during the course of verbalisation.

As more and more edges become involved in such a series, they indicate that one and the same agent string continues in holding the line in the articulation and that the α-strand grows in its entwining and thus is fading away deeper and deeper into the ongoing conceptualisation. The values of the developing helix constitute an apparent demonstration of rotational dynamics.

When a super string becomes allied with large magnitudes, this gives expression to a higher degree of displacement than a super string, associated with smaller magnitudes. The larger the distance to be covered by a textual agent the greater is the rate of fading.

The capacity to trace these rotational patterns in an open "spherical space" (Winfree, 1980, p. 8) comes from the observation that the A-component is contributing to the formation of covalent bonds. The function of the expression is to account for the fading in the A-component. Fading can be conceived of as the result of declining values. The AaO-formula illustrates the needed balancing operation. When a ($\alpha\beta$) composite is involved, expression (9) incorporates both rotation and acceleration.

Sentence Marker+Dummy at Sentence Border within a Paragraph (A9)
[Counter-clockwise: (-1); Clockwise: (8/8+…)]

Code	*String*	*Radians*	*Sum*
00	[.]		
01	[*]		
30	Work	0.345400	0.471000
		3.140000	ϕ_1=3.611000
40	refines	0.533800	
50	us	0.376800	
00	.	0.345400	1.256000
		3.140000	θ_1=4.396000
	But	0.816400	
30	$\varnothing_A$	6.280000	
		7.096400	Φ_1=3.107753
40	beautifies	0.682000	
50	rarely	0.345400	
01	.	0.345400	1.475800
		3.140000	θ_2=4.615800

It should be noted that the movement through the angle at a particular edge might or may not be equal to the joining radian. The pattern in the example (9) demonstrates the rotations that depend on transformational moves through certain angles within a paragraph.

The manner in which placeholders are propagating and attracting a flow is demonstrated with this pattern. Hence, a directional change as well as a change in orientation must come about in such a way that the empirical expression gets symmetry as well as rigour. In examining the pattern, it becomes evident that cyclic returns (κ_i) have to be observable, so that the placeholder before the verb can be substituted with corresponding values. These values are carried by the super strings of (α) as well as by the super strings of (β) of the preceding clause. Usually, this process varies in relation to the curled dislocations and the

evolving helical curve of the dislocation line. Very often, the layer of a curled text segment is determining the dislocation.

In agreement with expression (A8), the R-function carries the translation in accordance with expression $[\Phi-(½\phi)+(½\theta)]$. Therefore, the angle of refraction is $(\Phi=360°)$, where (ϕ) is depicting the rotation in the α-angle, while (θ) marks the corresponding rotation in the angle of (β). A rotation through the angle $(i\phi)$ or $(i\theta)$, followed or preceded by a rotation through either of these angles is equivalent to a rotation through the angle $[i\phi+i\theta]$. It follows that the clocks must be running in order to show corresponding magnitudes, which become structurally significant. The meaning of the involved winding operations appears in the depicted entanglement, which is at its acceleration maximum. At every reiteration of the cyclic processing, calculation becomes formally identical with an expression of acceleration as well as orientation in the A-component. In conclusion, the clocking mode of the A-component is timing the transformational moves of the super strings. Thus, from the processing point of view, rotational distance is directly related to the geometric phase transitions of the super strings.

Discussion

What is fundamentally new with the presented procedures has been demonstrated with two autonomous clocks, which determine rhythm and acceleration as well as orientation in the developing flows. A conclusion, to be drawn from the clocking mode of the AaO-mechanism is that the rotation of strings of graphemes is driving rhythmically operating work cycles in the direction toward the sharpest increase in acceleration. Since it has been made evident that the rhythmic and clock-like working mode of natural language production generates discontinuities, it can be concluded that a discontinuity suggests a change in a previous form of expression, “a morphogenesis” (Thom, 1972/1989). In the most fundamental sense, the study of structural stability and morphogenesis must begin with the observation of “discontinuity” (Winfree, 1980, pp. 12-14).

At the human level, the development of concepts and conceptual relations through the production of natural language expressions is one of the most fundamental and life-sustaining processes. Thereby, man-environment interactions are synthesised into conceptual relations and manifested by stringing together graphemes. But strings of graphemes are generating sequences, which become specifiable by their rotational dynamics in a simultaneously developing textual space. Moreover, non-linear dynamical processes are producing time morphologies. However, a precondition for their evolution is inherently related to the AaO-processing, since the process of equilibration must have the capacity to develop into movement patterns (i.e. intrinsic curvatures) that leave behind all contact with Euclidean spaces and consequently physical reality.

It follows that the pattern dynamics of natural language production must signify stability as well as change. The basic hypothesis is that a subtle interplay between the rhythmic string movements and winding strands is creating a space, in which singularities of different complexity evolve. At a certain given point in time at least one isolated phase singularity may arise in the simultaneously evolving space. But to handle the subtle distinctions of this process implies that one must be able to account for the way in which language employs its own intrinsic systems of coordinates. Their discovery and use provides an unbiased foundation for the regeneration of its space.

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